

REMARKS

Reexamination and reconsideration of the captioned application are requested in view of the foregoing amendments and remarks that follow.

Claims 1 to 4, 7, 9 to 12, 15, 16 and 18 to 34 remain for consideration on the merits.

Claims 35 to 71 have been canceled consonant with the Restriction Requirement of record.

The subject matter of originally filed claims 5 and 8 has been incorporated into claim 1.

Claims 3 and 11 have been amended to more clearly delineate the Markush grouping of nonionic vinyl monomers.

Claims 15, 19, and 27 have been amended to more clearly delineate the Markush grouping of semihydrophobic vinyl surfactant monomers.

Original independent claim 9 has been amended to depend from claim 1.

The dependency of claim 15 has been changed from claim 9 to claim 10. Consonant with the dependency change, the recitation of the amino substituted vinyl monomers has been rendered redundant and has been deleted.

The dependency of claim 18 has been changed from claim 17 to claim 15. In addition, the phrase "in said semihydrophobic monomer" has been inserted to provide clear antecedent basis for the "polyoxyalkylene group" originally set forth in the claim.

New claim 72 is presented to further delineate the semihydrophobic monomers set forth under formulas (IV) and (V) of claim 1. Support for the newly claimed subject matter is found on page 16, lines 14 to 24 of the specification as originally filed.

Relying on 35 USC § 103(a) the Examiner has rejected claims 1 to 34 as being unpatentable over U.S. Patent No. 5,639,841 (US '841.), or European Publication No. EP 0 444 791 (EP '791), or European Publication No. EP 0 398 576 (EP '576) or PCT Publication No. WO 96/35757 (WO '757). It is respectfully submitted that none of these citations taken alone or in combination render the presently claimed invention unpatentable.

Referring to US '841, it is submitted that the citation does not provide any teaching or suggestion that would motivate the artisan of ordinary skill to arrive at the presently claimed cationic associative polymer polymerized from a monomer mixture comprising:

- a) at least one amino-substituted vinyl monomer;

- b) at least one hydrophobic nonionic vinyl monomer;
- c) at least one associative vinyl monomer; and
- d) at least one semihydrophobic vinyl surfactant monomer.

Applicants have surprisingly found that incorporating a semihydrophobic vinyl surfactant monomer (as now delineated under monomer (d), formulas (IV) and (V), in claim 1) into a cationic associative polymer backbone enhances the emulsion stability, cationic salt stability, rheological and aesthetic properties of aqueous compositions containing the polymer.

As set forth in Example 1 of the instant specification, the emulsion stability of comparative cationic polymers (i.e., devoid of repeating units polymerized from semihydrophobic vinyl surfactant monomers) was evaluated to be poor when compared the polymers of the claimed invention. The emulsions of the inventive polymers set forth in Table 2 remained stable when subjected to five freeze/thaw (F/T) cycles and stored for five weeks at 45°C. In sharp contrast, the emulsion stability of the comparative cationic associative polymers set forth in Table 1 was poor (less than two months at ambient room temperature) or the polymer congealed making it impossible to measure viscosity.

As set forth in Example 2 (Tables 3-3A) of the instant specification, incorporating a semihydrophobic vinyl surfactant monomer into a cationic associative polymer backbone renders the polymer stable to cationic salts. Cationic associative polymers containing repeating units polymerized from semihydrophobic vinyl surfactant monomers provide good rheological and aesthetic properties to compositions that contain cationic salt additives. The instant polymers remained smooth textured and free flowing in aqueous compositions containing 1.5 wt. % of a cationic salt (cetyl trimethylammonium chloride). Aqueous compositions containing cationic associative polymers devoid of a semihydrophobic vinyl surfactant repeating units congealed and exhibited a grainy texture in the presence of a cationic salt.

The necessary monomer combination that produces the instantly claimed polymers and the attendant emulsion and storage stability properties as well as smooth textured and free flowing rheology properties could not be predicted from the US '841 citation. US '841 concerns a polymer thickener that is polymerized from a myriad of monomer permutations:

- (A) about 1-99.8 weight percent of one or more nonionic, cationic, anionic and/or amphoteric monomers;

- (B) about 0-98.8 weight percent of one or more monoethylenically unsaturated monomers, typically ethyl acrylate, different from component (A);
- (C) about 0.1-98.8 weight percent of one or more monoethylenically unsaturated macromonomers (containing a residue of a substituted or unsubstituted complex hydrophobe compound) different from components (A) and (B);
- (D) about 0.1-98.8 weight percent of one or more monoethylenically unsaturated macromonomers (containing a residue of a substituted or unsubstituted hydrophobe compound other than a complex hydrophobe compound) different from components (A), (B) and (C);
- (E) about 0-20 weight percent or greater of one or more polyethylenically unsaturated monomers, typically trimethylol propane triacrylate, different from components (A), (B), (C) and (D); and
- (F) about 0-25 weight percent or greater of one or more acrylates and/or methacrylates derived from a strong acid or a salt of a strong acid, typically 2-sulfoethyl methacrylate, different from components (A), (B), (C), (D) and (E).

The macromonomer disclosed under component (C) is more specifically defined at column 4, under formula (I), wherein R^1 is defined as a monovalent residue of a substituted or unsubstituted complex hydrophobe compound. More specifically, the complex hydrophobe (R^1) is described at column 5 under formulae (III) and (IV). As can readily be determined the complex hydrophobes are highly branched compounds. These branched complex hydrophobe containing macromers of U.S. '841 are not suggestive of the associative or semihydrophobic monomers recited under monomer components (c) and (d) of the present invention (compare groups R^5 and R^9 in formulas III, IV and V of the present invention with the complex hydrophobe R^1 set forth under formulas III and IV in column 5 of US '841

The macromonomer described under component (D) is defined at column 4, under formula (II), wherein R^1 is defined as a monovalent residue of a substituted or unsubstituted hydrophobe compound other than a complex hydrophobe compound. While the macromonomers described under formula (II) of US '841 are typical associative monomers recited under monomer component (c) of the instantly claimed invention, there is no suggestion or teaching motivating the artisan of ordinary skill to incorporate a semihydrophobic monomer into a cationic associative polymer to impart salt and storage stability properties and rheological aesthetics to the polymer backbone. There is no disclosure anywhere in US '841 that provides the teaching, suggestion, or motivation to improve the stability and properties of a cationic

associative polymer by the necessary combination of a) at least one amino-substituted vinyl monomer; b) at least one hydrophobic nonionic vinyl monomer; c) at least one associative vinyl monomer; and d) at least one semihydrophobic vinyl surfactant monomer.

While cationic monomers are disclosed as a possible monomer component in US '841, there is no disclosure or exemplification of a cationic associative polymer whatsoever in the citation. All of the polymers exemplified in US '841 (Table C) contain an anionic monomer component, i.e., methacrylic acid (MMA). These polymers are anionic thickeners which are used in high pH applications (i.e., they thicken by base neutralization). US '841 does not recognize or address the problems inherent with cationic associative polymeric thickeners which are used in lower pH applications. As discussed in the present specification, prior art cationic associative thickeners suffer several drawbacks such as emulsion and shelf-life instability to freeze/thaw cycles, high temperature shelf-life instability, and inadequate rheology aesthetics when exposed to cationic salts. US '841 exemplifies alkali-swellable polymer thickener compositions comprising methacrylic acid, ethyl acrylate, and one or more ethylenically unsaturated complex macromonomers for use in paint compositions. US '841 is directed towards the use of a complex hydrophobic macromonomer in combination with a simple hydrophobic macromonomer to improve the rheology profile of alkali-swellable (anionic) polymers. While cationic monomers are disclosed in a laundry list of all conceivable monomeric types, i.e., cationic, anionic, nonionic monomers, and amphoteric, there is no disclosure that would motivate one skilled in the art to copolymerize a combination of monomers selected from a) at least one amino-substituted vinyl monomer; b) at least one hydrophobic nonionic vinyl monomer; c) at least one associative vinyl monomer; and d) at least one semihydrophobic vinyl surfactant monomer and have any reasonable expectation of success in enhancing the stability, texture, and rheology profile of an acid swellable cationic associative polymer.

The Examiner rejected claims 1 to 34 for obviousness on the basis of the disclosure in EP 0 444 791 (EP '791). EP '791 discloses polymer thickeners for aqueous-based coatings comprising a) at least one first hydrophobic monomer within the scope of the claimed associative vinyl monomer and the semihydrophobic vinyl surfactant monomer of the pending application, b) an unsaturated ionizable monomer (including amino substituted vinyl monomers), c) an

ethylenically unsaturated nonionic monomer characterized in that 10 to 100 wt. % of said monomer is at least one second hydrophobic monomer selected from , and optionally d) a multifunctional monomer, to provide an improvement in viscosity stability upon colorant addition.. EP '791 however, does not disclose, nor teach, enhancement of the stability and rheology of acid-swellaable cationic associative polymers through the necessary combination of a) at least one amino-substituted vinyl monomer; b) at least one hydrophobic nonionic vinyl monomer; c) at least one associative vinyl monomer; and d) at least one semihydrophobic vinyl surfactant monomer. There is nothing in the EP '791 disclosure that would motivate one skilled in the art to copolymerize into the claimed cationic polymer, an amino-substituted monomer, an associative vinyl monomer having a hydrophobic end group, and a semihydrophobic vinyl surfactant monomer and have any reasonable expectation of success in enhancing stability, aesthetics, and rheology.

As in the US '841 citation, there is no disclosure or exemplification of a cationic associative polymer. All of the polymers exemplified in EP '791 are alkali-swellaable and contain an anionic monomer component. To go from the teachings of EP '791 to the presently claimed invention the skilled artisan must make several significant modifications: 1) The polymer must be made cationic by replacing the anionic monomer component with an amino-substituted monomer component; 2) the artisan must include an associative monomer that contains a hydrophobe as defined by R⁵ of the present invention, 3) the artisan must include a second monomer where the polyoxyalkylene moiety is terminated with hydrogen or a C₁ to C₄ alkyl group. There is no guidance in the citation that would provide the motivation to make such changes with the expectation of improving emulsion and shelf-life stability to freeze/thaw cycles, high temperature shelf-life stability, and rheology aesthetics when exposed to cationic salts.

The Examiner rejected claims 1 to 34 for obviousness on the basis of the disclosure in EP 0 398 576 (EP '576). The Examiner contends that monomers Q-2 (methacrylate ester of a 23 mole ethoxylate of lauryl alcohol), Cr-20 (crotyl ester of a 20 mole ethoxylate of cetyl-stearyl alcohol), Al-20 (allyl ester of cetyl-stearyl alcohol), and MA-20 (methacrylate ester of a 20 mole ethoxylate of cetyl-stearyl alcohol) are exemplified as suitable hydrophobic monomers within the terms of the instant associative vinyl monomer and semihydrophobic vinyl surfactant monomer claimed in the present application. As pointed out by the Examiner the disclosure of EP '576 is

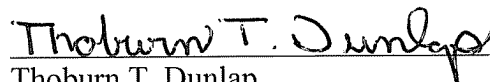
similar to the disclosure of EP '791 *supra*. As discussed above, there is no teaching, suggestion or implication in the citation that provides the artisan of ordinary skill with the motivation to select a combination of a) at least one amino-substituted vinyl monomer; b) at least one hydrophobic nonionic vinyl monomer; c) at least one associative vinyl monomer; and d) at least one semihydrophobic vinyl surfactant monomer. As set forth in applicants' amended claims the instantly claimed associative vinyl monomer (delineated by formula (III)) and semihydrophobic vinyl surfactant monomer (delineated by formula (IV)) are not structurally equivalent. The claimed associative vinyl monomer contains a hydrophobic end group represented by terminal hydrophobic moiety R⁵, and the claimed semihydrophobic vinyl surfactant monomer contains a terminal semihydrophobic moiety represented by moiety R⁹. Terminal moieties R⁵ and R⁹ are structurally and functionally different. Contrary to the Examiner's contention, the specific monomers (Q-2, Cr-20, Al-20, and MA-20) that are exemplified in the EP '576 disclosure do not meet the requirements of the instant semihydrophobic vinyl surfactant monomer. Monomers MA-20, Cr-20 and Al-20 are derived from cetyl-stearyl alcohol. Cetyl-stearyl alcohol is a mixture of C₁₆ and C₁₈ fatty alcohols. The recited monomers derived from cetyl-stearyl alcohol would contain C₁₆/C₁₈ hydrophobic end groups. Monomer Q-2 is derived from lauryl alcohol which is a C₁₂ alcohol. Monomer Q-2 would contain a C₁₂ hydrophobic end group. Examples 2A, 2B and Comparative Example 3B disclose polymers polymerized from a monomer mixture containing MA-20 (containing C₁₆/C₁₈ hydrophobes) and Q-2 (containing a C₁₂ hydrophobe). Simply stated there is no teaching in EP '576 requiring the combination of a cationic monomer, an associative vinyl monomer, and a semihydrophobic vinyl surfactant monomer with the expectation of improving emulsion and shelf-life stability to freeze/thaw cycles, high temperature shelf-life stability, and rheology aesthetics when exposed to cationic salts.

With respect to WO 96/35757 (WO '757) it is submitted that this citation does not describe, teach, suggest or imply the combination of monomers defined in the present claims. There is no basis in the WO '757 citation that provides the artisan of ordinary skill with any motivation to select the specific combination of associative and semihydrophobic monomers to polymerized into the instantly claimed cationic polymer backbone. The WO '757 disclosure concerns anionic polymeric thickeners that are polymerized from carboxylic acid containing monomers in combination with optional associative monomers. There is no disclosure, teaching

or suggestion of a semihydrophobic vinyl surfactant monomer. Moreover, there is no disclosure, teaching or suggestion of a cationic (amino-substituted vinyl monomer) monomer. There is no teaching anywhere in this citation that requires the necessary combination of a) at least one amino-substituted vinyl monomer; b) at least one hydrophobic nonionic vinyl monomer; c) at least one associative vinyl monomer; and d) at least one semihydrophobic vinyl surfactant monomer.

In view of the discussion above, it is submitted that none of the citations relied on by the Examiner taken alone or in combination renders the instantly claimed subject matter obvious. Accordingly, withdrawal of the rejection is respectfully requested and an early Notice of Allowance with respect to the pending claims is earnestly solicited.

Respectfully submitted,



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